Experiments for ascertaining the Velocity of Sound, at Madras in the East Indies. *By* John Goldingham, *Esq. F.R.S.* Read February 20, 1823. [*Phil. Trans.* 1823, *p.* 96.]

The author commences this paper with an abstract of the opinions, experiments, and calculations of several eminent philosophers who have studied the above subject; and after remarking upon their discordant results, observes that his own experiments may perhaps furnish a clue for discovering the cause of such differences. These were made at Fort St. George, where a morning and evening gun are fired from the ramparts, the former at daylight, and the latter at 8 o'clock in the evening. Morning and evening guns are also fired at St. Thomas's Mount; and between these the Madras Observatory is situated, in latitude 13° 4′ 8″ N., at which the observations were made with chronometers of 100 beats in 40 seconds. Each observer began to count the beats in the interval of the flash and report. Their number was registered, as well as the height of the thermometer, barometer, and hygrometer, and the state of the wind and weather at the time. The distances of the guns from the observatory were ascertained with much precision; that of the Mount gun being 29547 feet, and of the Fort gun 13932·3 feet. The results of these experiments are given in eleven annexed tables. From Tables 1 and 6, it appears that the velocity of sound is much affected by different states of the atmosphere and weather; and from Tables 2 and 7, we find as the thermometer rose, the atmosphere at the same time decreasing in density, sound moved with increased rapidity. The mean velocity of sound deduced from these experiments appears to be 1142 feet in a second, which closely corresponds with the estimate of Newton and Halley. The comparison of the experiments with the Mount and Fort guns seems to show that sound travels equally in its progress; and by comparing the observations upon the influence of wind, a difference is found of 1275 feet in a minute between the wind being in the direction of the motion of the sound, and opposed to it.

On the Double Organs of Generation of the Lamprey, the Conger Eel, the common Eel, the Barnacle, and Earth Worm, which impregnate themselves; though the last from copulating, appear mutually to impregnate one another. *By Sir* Everard Home, *Bart. V.P.R.S.* Read February 27, 1823. [*Phil. Trans.* 1823, *p.* 140.]

Having previously ascertained the teredo and the lamprey to be hermaphrodites, and that in these tribes the same individual both forms and impregnates the ova, the author shows upon the present occasion, that eels and barnacles are similar in their mode of generation. In respect to the former, the author adopts the opinion of Sir Humphry Davy, that the common and the conger eel belong to the same species, their difference in size and colour depending upon the one living in fresh and the other in salt water. Their organs of

generation are precisely similar. Sir Everard points out some errors into which anatomists had fallen in describing these, more especially with respect to the eel tribe, in which the kidneys being immediately behind the peritoneum, and closely connected, the whole mass has been mistaken for kidney.

In that species of barnacle called *Lepas anatifera*, the ovaria are situated round the œsophagus, and the ova are impregnated before they leave the ovaria.

The author concludes this paper with an account of the structure of the organs of generation in the earth worm, and of their mode of copulation. These, as well as the other anatomical facts detailed in this communication, are illustrated by reference to a variety of drawings.

On a New Phenomenon of Electro-magnetism. By Sir Humphry Davy, *Bart. Pres. R.S.* Read March 6, 1823. [*Phil. Trans.* 1823, *p.* 153.]

About fifteen months ago it occurred to Sir Humphry Davy to try the action of a magnet upon mercury, connected in the electric circuit; and having very lately had occasion to repeat the experiment in a more perfect manner, by the aid of a battery, consisting of a single pair of plates of about 100 square feet, constructed for the London Institution, under the direction of Mr. Pepys, he is induced to lay the result of the experiment before the Royal Society, as presenting a phenomenon which may prove important hereafter in its relations to the theory of electro-magnetism.

When two wires were placed in a basin of mercury, perpendicular to the surface, and in the voltaic circuit of the above-mentioned battery, the mercury revolved according to the common law of electro-magnetic rotation, upon presenting a magnet either above or below the wires; and the velocity was increased by using the opposite poles of two magnets, one above and the other below the mercury. When the pole of the magnet was held above the mercury, and between the two wires, the circular motion ceased, and currents took place in the mercury in opposite directions. These and other circumstances induced Sir Humphry Davy to believe that the passage of the electricity through the mercury, produced motions independent of the magnet, and that the rotations described were owing to a composition of forces; and, moreover, that such motions would, from the position of the wires, occur chiefly at the lower surface of the mercury; he therefore inverted the form of the experiment, bringing the copper wires through two holes in the bottom of a glass basin, with so much mercury in it as to stand one tenth of an inch above the polished ends of the wires. Upon making the communication with the battery, the surface of the mercury was elevated into a small cone above each of the wires, from which waves flowed off in all directions, the only apparent point of rest being central, between the wires. These cones were diminished by the approximation of